IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicants: Hidetoshi SAITO et al.

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For: FUNCTIONAL ELEMENT FOR USE IN AN ELECTRIC, AN ELECTRONIC OR AN OPTICAL DEVICE AND METHOD FOR PRODUCING THE SAME

Art Unit: 1775

Examiner: Jason L. Savage

DECLARATION UNDER 37 C.F.R. 1.132

I, the undersigned, Yoshikazu UEDA, a Japanese citizen, residing at Asahi Kasei Ookubo Shataku 2-tou 225, 36-2, Oo-kubo 3-chome, Konan-ku, Yokohama-shi, Kanagawa-ken 233-0007, Japan, hereby declare and state that:

I majored in petrochemistry at the engineering course, the Graduate School, Kyoto University, and I was graduated therefrom in March 1989.

I entered Asahi Kasei Kabushiki Kaisha in April 1989.

I was engaged in the research and development of polymer alloys from April 1989 to July 1991. I was engaged in the research and development of olefin polymer resins from July 1991 to January 1996. I was engaged in the research and development of styrene polymer resins from January 1996 to March 1998. I was engaged in the research and development of uses for new inorganic metal oxides from April 1998 to October 1999. I was engaged in the research and development of technology for the recycling of plastics from October 1999 to November 2001. I was engaged in the research and development of polycarbonate resins from December 2001 to June 2002. I have been engaged in the research and development of uses for new inorganic materials from July 2002 to date.

I am one of the applicants of the above-identified application and I am well familiar with the present case.

I have read and understood the Office Action dated June 20, 2002 and the references cited therein.

I carried out Examples 1 to 7 and Comparative Example of the present specification, and the results are as described on pages 79 to 90 of the specification of the present application.

I have performed an experiment to show that **the feature** (in claim 9 of the present application) that the heating temperature of the substrate is **higher than** the temperature of the metal compound gas **is critical for** producing the functional element of the present invention. The method and results of the experiment are as described in a paper attached hereto and marked "Exhibit 1".

The procedure of the experiment of Exhibit 1 is a slight modification of the procedure of Example 1 of the present specification. In Example 1 of the present specification, a functional element was produced under reaction conditions wherein the metal compound (zinc acetylacetonate) was gasified at **115 °C** (i.e., the temperature of the metal compound gas was 115 °C), and the substrate was heated to **550 °C**.

In the experiment of Exhibit 1, substantially the same procedure for producing a functional element as in Example 1 of the present specification was repeated **except that the substrate was heated to 115 °C**, which is **the same as** the temperature of the metal compound gas (i.e., gasified zinc acetylacetonate). That is, in this experiment, **the feature** in claim 9 that the heating temperature of the substrate is **higher than** the temperature of the metal compound gas was <u>not</u> satisfied.

As a result, <u>no</u> metal oxide needles could be grown on the surface of the substrate. Therefore, a functional ele-

ment of the present invention could not be obtained.

From the above-mentioned results of Exhibit 1, it can be fairly concluded that **the feature** in claim 9 that the heating temperature of the substrate **is higher than** the temperature of the metal compound gas **is critical for** producing the functional element of the present invention.

The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: November 12, 2002 Yoshikazu Ueda

Yoshikazu UEDA

Exhibit 1

An experiment to show that **the feature** (in claim 9 of the present application) that the heating temperature of the substrate is **higher than** the temperature of the metal compound gas **is critical for** producing the functional element of the present invention

1. Object of the experiment:

The object of the experiment of this Exhibit 1 is to show that **the feature** (in step (b) of the method of claim 9 of the present application) that the heating temperature of the substrate is **higher than** the temperature of the metal compound gas **is critical for** producing the functional element of the present invention.

2. Explanation:

In item 3. below, reference is made to Example 1 of the present specification (described at page 79, line 14 to page 81, line 2 of the present specification). For easy reference of the procedure of Example 1 of the present specification, the description of Example 1 is reproduced below.

"Example 1

Using a system as shown in Fig. 1, a functional element was produced as follows. Zinc acetylacetonate ($Zn(C_5H_7O_2)_2$) was charged into a metal com-

pound-heating vessel. The vessel was heated to gasify the zinc acetylacetonate under conditions wherein the internal temperature of the vessel was 115 °C. A single crystal plate (Al_2O_3) as a substrate, having a size of 10 mm x 5 mm, was placed on a heater located just under a blow-off slit of a nozzle so that the (0001) face of the Al_2O_3 single crystal faced the slit. The substrate was heated to 550 °C by means of the heater. Dry nitrogen gas was introduced into the metal compound-heating vessel at a flow rate of 1.2 dm^3/min. The gasified zinc acetylacetonate in the vessel, entrained by the nitrogen gas, was applied through the blow-off slit of the nozzle onto the surface of the Al_2O_3 single crystal plate under atmospheric pressure, thereby growing metal oxide (ZnO) needles on the surface of the substrate. 300 minutes after the start of the application, a functional element comprising the substrate and, grown on the surface thereof, a plurality of the metal oxide (ZnO) needles was obtained, which was then removed from the system.

Gold (an electroconductive substance) was vapor deposited on the functional element by sputtering at a thickness of 0.1 μm. Then, an observation of the functional element was conducted using a scanning electron microscope (hereinafter referred to simply as an "SEM").

In order to elucidate the three-dimensional structure of the functional element, SEM photomicrographs showing perspective views of the obtained functional element were taken, and shown in Figs. 2 (a) and 2 (b). The metal oxide (ZnO) needles had a weighted average circle-based diameter of 1.2 μm, a weighted average length of 100 μm and a density of 500 needles per unit area having a size of 10 μm x 10 μm. Further, the leaning angles of the crystal axes of the metal oxide needles were each 0.9 degree." (emphasis added)

As seen from the above, in Example 1 of the present specification, the metal compound (zinc acetylacetonate) was gasified at **115 °C** (i.e., the temperature of the metal compound gas was 115 °C), and the substrate was heated to **550 °C**.

3. Method and Results:

Substantially the same procedure for producing a functional element as in Example 1 of the present specification was repeated **except that the substrate was heated to 115 °C**, which is **the same as** the temperature of the metal compound gas (i.e., gasified zinc acetylacetonate). That is, in this experiment, **the feature** in claim 9 that the heating temperature of the substrate is **higher than** the temperature of the metal compound gas was not satisfied.

As a result, no metal oxide needles could be grown on the surface of the substrate. Therefore, a functional element of the present invention could not be obtained.

4. Conclusion:

The feature in claim 9 that the heating temperature of the substrate is **higher than** the temperature of the metal compound gas **is critical for** producing the functional element of the present invention.